


SPECIAL VDOT NOTICE
To All Manufacturers, Suppliers, and Contractors
Regarding Changes in Requirements for:
1) Reflective Sheeting
2) Pavement Marking

September 23, 2009

The Virginia Department of Transportation (VDOT) is further developing (refining) its specifications regarding the above listed items. The use of these refined specifications will be introduced over a period of time such that manufacturers might adjust their production, the suppliers might adjust their purchasing and stockpiling strategies, and the contractors might plan accordingly. A general description of these adjustments is provided below.

Should you have question or concern, please address them to the following generic VDOT e-mail account on or before December 11, 2009: Traffic.Eng.Spe.Change@VDOT.Virginia.gov


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General Description of Adjustments:

1) Section 247 of the Road and Bridge Specification - Reflective Sheeting

A refined specification for the reflective sheeting materials supplied is being developed. A final draft of that refined specification dated September 22, 2009 is attached. With this refinement, three significant changes will occur.

- **ASTM Type IX Sheeting for all Permanent Signs**

In particular, these changes will result in those permanent signs currently allowed to be produced under an ASTM Type III material or better requirement becoming an

ASTM Type IX material or better; with an exception being made for sheeting used on recreational and cultural interest area guidance signs and the hand symbol/DON'T WALK and numerals on the educational pedestrian signal signs (R10-3a thru R10-3e) which will be required to be a Type III or better material.

Type III materials or better are currently allowed by Section 247.02 (a) and (j).

This part of the refinement to Section 247 is targeted for use with contracts advertised in **March of 2010 and thereafter**.

- **Orange Sheeting on Drums and Temporary Sand Barrels**

This refined specification requires a fluorescent orange flexible sheeting material which is a departure from the material currently specified in Section 247.02 (b).

VDOT recognizes that suppliers and contractors might have stock on hand that would typically serve them for a year or more. To that end, VDOT recognizes a need to allow that part of the current specification that addresses this material to remain in effect on a portion of all contracts, while imposing the new specification on others. This will effectively result in a transition plan that would allow contractors to obtain a useful life from their existing stock. Therefore, that part of this refined specification will be staged into total effect on the following schedule:

- a. This part of the refined specification will be in effect for contracts involving work on limited access highways and advertised in **January, 2011 and continuing thereafter**;
- b. This part of the refined specification will be in effect for all contracts on all roadway classifications advertised **January, 2012 and continuing thereafter**;
- c. For all contracts advertised during January, 2011 or thereafter, all drums and temporary sand barrels in use on VDOT projects and not covered by sub-paragraphs "a" and "b" above, shall meet the refined specification beginning **January 1, 2014 and continuing thereafter**;
- d. **Beginning immediately**, products meeting this refined specification will be allowed on all contracts as an "equal to or better than" substitution to the products specified in the contracts that prevails, but at no additional cost to VDOT. This is done so that contractors might use these products to enhance motorists and worker safety.
- e. **Under no circumstance** will the mixing of fluorescent orange materials on drums and temporary sand barrels and non-fluorescent orange materials on drums and temporary sand barrels be allowed on the same roadway segment.

- **Roll-Up Temporary Signs**

Section 247.02 (i) of this refined specification will not require that manufacturers, suppliers, or contractors change from the materials now allowed, but will simply open the specification such that additional manufacturer's materials might be

supplied. This part of the refined specification is targeted for use with contracts advertised in **March of 2010 and continuing thereafter.**

2) Section 246 of the Road and Bridge Specification - Pavement Markings

Section 246.02 (g) is refined to include a new provision for Type D, Class III Temporary Pavement Marking wherein wet reflective characteristics are included, has been developed and approved for use. A copy of that Special Provision dated October 18, 2007 is attached for reference. The industry was made aware several years ago that this type of specification would be forthcoming from VDOT so that manufacture's R&D could occur. However, the actual refined specification has not been available until now; thus this refined specification will be phased into total effect over a period of one year, allowing the manufactures time to adjust their products and production accordingly. The targeted schedule for the introduction of this refined specification is:

- a. Beginning with advertisements made in **March of 2010 and continuing thereafter**, this refined specification (Special Provision) will prevail on all contracts that involve NHS routes, in part or in full. Contract documents identify the involvement of NHS routes.
- b. Beginning with advertisements made in **March 2011 and continuing thereafter**, this refined specification will prevail on all contracts.
- c. **Beginning immediately**, products meeting this refined specification will be allowed on all contracts as an "equal to or better than" substitution to the products specified in the contracts that prevails, but at no additional cost to VDOT. This is done so that contractors might use these products to enhance motorists and worker safety.

VIRGINIA DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION FOR
SECTION 247—REFLECTIVE SHEETING

Final Draft, September 22, 2009

SECTION 247 REFLECTIVE SHEETING is replaced with the following:

247.01—Description

This specification covers reflective sheeting used on traffic control devices to provide a retroreflective surface or message. The color of the reflective sheeting shall be as specified in the Contract Documents. Reflective sheeting shall be certified in accordance with the requirements of Section 106.06.

247.02—Detail Requirements

Reflective sheeting shall be selected from the Department's Approved Products list. Reflective sheeting products are included on the Approved Products List **only** after the Department determines conformance to the Specifications and the manufacturer has supplied written information indicating conformance to the warranty requirements of Section 247.03. Determination of conformance will include, but not be limited to, the evaluation of test data from AASHTO's National Transportation Product Evaluation Program (NTPEP) or other Department-approved facilities. When color test data provided by NTPEP or other Department-approved facilities are evaluated, color **must** have been maintained within the color specification limits for the full duration of the outdoor weathering test.

- (a) **Reflective sheeting used on permanent signs (except Section b), on object markers, nose of guardrails, permanent impact attenuators (except sand barrels), standard road edge delineators, special road edge delineators, barrier delineators, guardrail delineators, interstate road edge delineators, chevron panels, bridge end panel signs (VW-13), and railroad advance warning signs (including any supplemental plaques) vertical panels (Group 2 channelizing devices), traffic gates, and the "STOP" side of sign paddles (hand signaling device) shall conform to the requirements of ASTM D4956 for a Type IX material.**

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 1 and 1A (non-fluorescent colors) and Table 3 and 3A (fluorescent colors). In Table 1A, the values for daytime luminance factor (%) shall be based on the colors for a Type IV, VII, and VIII sheeting.

The maintained coefficient of retroreflection of the sheeting after 3 years on the test deck shall conform to the requirements of ASTM D4956.

1. **Reflective sheeting used on the following signs** shall be Fluorescent Yellow-Green conforming to the requirements of ASTM D4956 for a Type IX material:

- **Bicycle Crossing sign (W11-1) including supplemental plaques**
- **Pedestrian Crossing sign (W11-2) including supplemental plaques**
- **Playground sign (W15-1) including supplemental plaques**
- **DEAF CHILD AREA sign including supplemental plaques**
- **WATCH FOR CHILDREN sign including supplemental plaques**
- **School Signing consisting of the following:**
 - School Crossing sign (S1-1)**
 - School Bus Stop Ahead sign (S3-1)**
 - SCHOOL plaque (S4-3)**
 - School Portion of the School Speed Limit sign (S5-1)**
 - Supplemental plaques used with these signs**

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 3 and 3A.

The maintained coefficient of retroreflection of the sheeting after 3 years on the test deck shall conform to the requirements of ASTM D4956.

- (b) **Reflective sheeting used on recreational and cultural interest area guidance signs, and for the hand symbol / DON'T WALK and numerals on educational pedestrian signal signs (R10-3b thru R10-3e)** shall conform to the requirements of ASTM D4956 for a Type III material.

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 1 and 1A.

The maintained coefficient of retroreflection of the sheeting after 3 years on the test deck shall conform to the requirements of ASTM D4956.

- (c) **Reflective sheeting used to delineate the trailer's back frame of Portable Changeable Message Signs (PCMS), arrow boards and portable lights** shall conform to the requirements of 49 CFR 571.108 for a Grade DOT-C2 truck conspicuity marking. References to ASTM specifications therein shall be interpreted to mean the latest version of the specification regardless of the date indicated in the reference.

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 1 and 1A.

This reflective sheeting is not required to be tested by NTPEP.

- (d) **Reflective sheeting used on Type III barricades** shall conform to the following:

Minimum Coefficient of Retroreflection R_A
(R_A =Candelas per footcandle per square foot)

Observation Angle (°)	Entrance Angle (°)	White	Orange
0.2	−4	600	200
0.2	+30	270	120
0.2	+40	50	20
0.5	−4	220	80
0.5	+30	105	43
0.5	+40	40	15
1.0	−4	12	4
1.0	+30	10	3
1.0	+40	10	3

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 1 and 1A.

Impact Resistance shall conform to the requirements of ASTM D4956.

The maintained coefficient of retroreflection of the sheeting after 1 year on the test deck shall be at least 50 percent of the minimum coefficient of retroreflection values specified.

- (e) **Reflective sheeting used on orange construction and maintenance activity signs, barrier vertical panels installed on concrete traffic barrier service, rear panel of truck-mounted attenuators, temporary impact attenuators (except temporary sand barrels), and the "SLOW" side of sign paddles** shall conform to the requirements of ASTM D4956 for a Type IX, Fluorescent Orange material (with the following retroreflection exception):

Minimum Coefficient of Retroreflection R_A
(R_A =Candelas per footcandle per square foot)

Observation Angle (°)	Entrance Angle (°)	Fluorescent Orange
0.2	−4	<u>140</u>
0.2	+30	<u>90</u>
<u>0.2</u>	<u>+40</u>	<u>24</u>
0.5	−4	<u>90</u>
0.5	+30	<u>50</u>
0.5	<u>+40</u>	<u>15</u>
1.0	−4	<u>10</u>
1.0	+30	<u>5</u>
1.0	<u>+40</u>	<u>3</u>

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 3 and 3A.

The maintained coefficient of retroreflection of the sheeting after 1 year on the test deck shall be at least 50 percent of the minimum coefficient of retroreflection values specified.

- (f) **Reflective sheeting used on tubular delineators and drums** shall conform to the requirements of ASTM D4956 including supplementary requirement S2 for a Type III reboundable material. Color shall conform to the requirements of Tables 1 and 1A of the USDOT specification as contained in the appendix to 23 CFR, Part 655, Subpart F of the Code of Federal Regulations except the minimum daytime luminance factor for white shall be 25 when used on cones and tubular delineators. The following supplementary table shall apply for **tubular delineators and drums**:

Minimum Coefficient of Retroreflection R_A
(Candelas per footcandle per square foot)
(High Intensity)

Observation Angle (°)	Entrance Angle (°)	White	Orange
0.2	+50	75	25
0.5	+50	35	10

Reflective sheeting used on tubular delineators and drums is not required to be tested by NTPEP.

Reflective sheeting used on temporary sand barrels shall be fluorescent orange prismatic lens reboundable type conforming to the following:

Color shall conform to the requirements of Tables 3 and 3A of the USDOT specification as contained in the appendix to 23 CFR, Part 655, Subpart F of the Code of Federal Regulations.

Minimum Coefficient of Retroreflection R_A
(Candelas per footcandle per square foot)
(High Intensity)

Observation Angle (°)	Entrance Angle (°)	Fluorescent Orange
0.2	-4	200
0.2	+30	120
0.2	+50	40
0.5	-4	80
0.5	+30	50
0.5	+50	30

Maintained coefficient of retroreflection of the sheeting after 1 year on the test deck shall be at least 50 percent of the minimum coefficient of retroreflection values indicated above.

Reflective sheeting shall conform to the supplementary requirement S2 of ASTM D4956.

Beginning with all projects advertised on or after January 1, 2011 reflective sheeting used on Drums, Temporary Sand Barrels, and Tubular Delineators placed on Limited Access Roadways inclusive of ramps shall conform to the requirements of ASTM D4956 including supplementary requirement S2 for a Type III reboundable material (with the following retroreflection exception as shown in the chart below):

Beginning with all projects advertised on or after January 1, 2012 reflective sheeting used on Drums, Temporary Sand Barrels, and Tubular Delineators regardless of roadway classification shall conform to the requirements of ASTM D4956 including supplementary requirement S2 for a Type III reboundable material (with the following retroreflection exception as shown in the chart below):

Beginning July 1, 2014 reflective sheeting used on Drums, Temporary Sand Barrels, and Tubular Delineators for all projects, regardless of the date of award or roadway classification, shall conform to the requirements of ASTM D4956 including supplementary requirement S2 for a Type III reboundable material (with the following retroreflection exception as shown in the chart below):

Minimum Coefficient of Retroreflection R_A
(R_A =Candelas per footcandle per square foot)
(Prismatic Lens)

Observation Angle (°)	Entrance Angle (°)	White	Fluorescent Orange
0.2	-4	<u>400</u>	<u>175</u>
0.2	+30	<u>200</u>	<u>100</u>
0.2	<u>+40</u>	<u>135</u>	<u>60</u>
0.2	<u>+45</u>	<u>120</u>	<u>40</u>
0.5	-4	<u>150</u>	<u>70</u>
0.5	+30	<u>50</u>	<u>30</u>
0.5	<u>+40</u>	<u>45</u>	<u>25</u>
0.5	<u>+45</u>	<u>40</u>	<u>20</u>

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 1 and 1A (non-fluorescent colors) and Table 3 and 3A (fluorescent colors).

The maintained coefficient of retroreflection of the sheeting after 1 year on the test deck shall be at least 50 percent of the minimum coefficient of retroreflection specified.

- (g) Reflective sheeting used on Permanent Sand Barrels and Cones shall conform to the requirements of ASTM D4956 including supplementary requirement S2 for a Type III reboundable material. The following supplementary table shall apply for cone collars:

Minimum Coefficient of Retroreflection R_A
(R_A =Candelas per footcandle per square foot)
(High Intensity)

Observation Angle (°)	Entrance Angle (°)	White
0.2	+50	60
0.5	+50	35

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 1 and 1A.

The maintained coefficient of retroreflection of the sheeting after 1 year on the test deck shall be at least 50 percent of the minimum coefficient of retroreflection specified for permanent sand barrel sheeting.

Reflective sheeting for cones is not required to be tested by NTPEP.

- (h) **Reflective sheeting used on retroreflective rollup signs** shall conform to the following:

Minimum Coefficient of Retroreflection R_A
(R_A =Candelas per footcandle per square foot)
(Prismatic Lens)

Observation Angle (°)	Entrance Angle (°)	White	Fluorescent Orange
0.2	-4	<u>500</u>	200
0.2	+30	<u>200</u>	<u>80</u>
0.5	-4	<u>225</u>	<u>90</u>
0.5	+30	<u>85</u>	<u>35</u>
<u>1.0</u>	-4	<u>20</u>	<u>10</u>
<u>1.0</u>	+30	<u>15</u>	<u>8</u>
<u>1.5</u>	-4	<u>5</u>	<u>3</u>
<u>1.5</u>	+30	<u>4</u>	<u>1.5</u>

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 1 and 1A for white, and Appendix Tables 3 and 3A for fluorescent orange.

Reflective sheeting for rollup sign is not required to be tested by NTPEP.

247.03—Warranty Requirements

The reflective sheeting manufacturer shall provide the following warranties to the Department on its products:

- (a) **Type III Sheeting (Permanent Use):** 12-year warranty with 10 years being 100 percent full replacement covering all material and labor costs associated with fabrication and installation of the sign or device and the final 2 years being 100 percent sheeting replacement cost.

- (b) Type IX Sheeting (Permanent Use): 10-year warranty with 7 years being 100 percent full replacement covering all material and labor costs associated with fabrication and installation of the sign or device and the final 3 years being 100 percent sheeting replacement cost.

The warranty shall cover the loss of retroreflectivity, loss of colorfastness, cracking, and any other conditions inherent to the sheeting including inks and overlay film that cause it to be ineffective in providing the direction to the motorists as intended.

The minimum values of retroreflectivity maintained during the warranty period shall be the same as those required for the maintained coefficient of retroreflection values as indicated herein or as specified in ASTM D4956 if they do not exist herein. For reflective sheeting indicated in **Section 247.02(h)** (Rollup Signs), the minimum values of retroreflectivity maintained during the warranty period shall be no less than 50 percent of the minimum coefficient of retroreflection values specified herein.

Loss of colorfastness is considered to have occurred if the color of the sheeting is not within the color specification limits in 23 CFR, Part 655, Subpart F, Appendix **during the full duration of the warranty period.**

Warranty periods shall begin on the date of installation in the field and shall be documented as follows:

For warranty requirements, each permanent sign shall be **labeled** on the reverse in a location not to be obscured by sign supports or backing hardware, showing 1.) Month and year the sign was installed in the field location, marked via punch-out numerals, 2.) Sheeting Manufacturer's name or logo and **product designation or number**, and 3.) Sign fabricator's name or logo. **Such label shall be of a self adhesive, permanent weather resistant material and shall be a minimum 4" by 4" in size. Label may be made from permanent sign material provided the finished label meets all other aspects required for warranty documentation.**

Where the information required for the label is not furnished by punched-out numerals, it shall be supplied by permanent means, such as sign ink, capable of resisting weathering so as to be legible for the full duration of the warranty period. In such cases the date of installation shall not be painted on until the actual date of installation in the field.

The label shall be applied to the reverse of the aluminum sign panel. Prior to applying the label, the area shall be thoroughly cleaned to ensure proper adhesion.

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
**TYPE D, CLASS III CONSTRUCTION PAVEMENT MARKINGS
AND PAVEMENT MESSAGE MARKINGS**

October 18, 2007

I. DESCRIPTION

This work shall consist of furnishing and installing white and/or yellow construction pavement markings and white construction pavement message markings within construction work zones.

II. MATERIALS

Marking material shall consist of removable tape suitable for use on both asphalt and hydraulic cement concrete surfaces and shall conform to the requirements of ASTM D 4592 Type I and the following.

A. General

Materials shall withstand air and roadway temperature variations from 0 to 140 degrees F without deforming, bleeding, staining, or discoloring and shall maintain their original dimensions and placement without chipping, spalling, delaminating, loss of adhesion or cracking. Material shall not deteriorate because of contact with sodium chloride, calcium chloride, magnesium chloride, mild alkalis and acids, or other ice control materials; oil in the pavement material; or oil and gasoline drippings from vehicles.

Marking material shall not be formulated with any compounds of the heavy metals listed in 40 CFR 261.24 Table 1 except that barium sulfate is allowed. Total heavy metal levels, with the exception of barium sulfate, shall not exceed 20 times the specified regulatory limits.

The amount and type of yellow pigment and inert filler for yellow material shall be at the option of the manufacturer provided the material complies with all other requirements of this specification.

Retained daytime and nighttime color of markings shall conform to the requirements of ASTM D 6628 when measured on an installed beaded marking after a period of ninety days. Reading may be taken from the NTPEP test deck or actual field installation.

B. Maintained Retroreflectivity, Removability and Adhesion: Maintained dry retroreflectivity, removability and adhesion shall conform to the following after being installed on a NTPEP test deck for 90 days. Conformance to the following continuous wetting retroreflectivity requirements will be determined after a 90-day field test accomplished by the Department.

1. **Maintained Retroreflectivity:** Photometric quantity to be measured is the coefficient of retroreflected luminance (R_L) in accordance with the requirements of ASTM E 1710 for dry retroreflectivity and VTM-123 for continuous wetting conditions. R_L shall be expressed in millicandelas per square foot per foot-

candle. Measurements shall be performed in the wheel path area for dry conditions and in the skip line/centerline area for wet conditions.

Color	Coefficient of Retroreflected Luminance (R_L)	
	Dry Conditions	Continuous Wetting Conditions
White	200	200
Yellow	100	100

2. **Removability:** Removability value shall be at least 8 for materials submitted to NTPEP prior to the year 1998. For materials submitted to NTPEP in the year 1998 and later, the internal tape strength value shall be no greater than 3, and the adhesive bond value shall be no greater than 7. Values shall be the average of the three monthly readings for the transverse line.
 3. **Adhesion:** No line shall have walked nor shall it be torn or missing.
- C. **Warranty:** The manufacturer shall provide a full manufacturer's warranty on their product that shall ensure and cover the retroreflectivity, removability and adhesiveness. The warranty period shall be no less than 180 days, beginning on the date of installation and shall include all material and labor costs when installed in accordance with the manufacturer's recommendations.
- D. **Acceptance:** Only pavement marking materials that are included on the Department's Approved Products list will be allowed for use. Pavement marking materials will be included on the Approved Products list after the Department determines conformance to the specifications for use of the product on both asphalt and hydraulic cement concrete surfaces, which includes the manufacturer supplying written information to the Department indicating conformance to the warranty requirements herein.

III. APPLICATION

Construction pavement markings including message markings shall be installed on existing, temporary and final surfaces at locations shown on the plans and in the *Virginia Work Area Protection Manual* and at locations as directed by the Engineer.

Construction pavement markings including message markings shall be installed in accordance with the manufacturer's recommendations. The Contractor shall furnish a copy of the manufacturer's installation recommendations to the Engineer prior to installation.

Construction pavement message markings shall consist of messages in accordance with the requirements of Section 704 of the Specifications.

The Contractor shall maintain the construction pavement markings including message markings in accordance with the third through the tenth paragraphs of Section 512.03(i) of the Specifications with the following exception and additions:

EXCEPTION

- Cost of reapplying markings shall be borne by the Contractor at no cost to the Department except markings that have been under traffic for more than 180 days will be paid for at the contract unit price unless the manufacturer's warranty coverage is still in effect.

ADDITIONS

- Retroreflective measurements for construction pavement message markings shall be taken outside of the wheel path locations and each separate entity of a pavement message marking shall be replaced when the average of the three readings for that entity is below 100 millicandelas per square foot per footcandle.
- The Contractor is also required to maintain the markings to provide retroreflectivity during wet night conditions. The Engineer will make periodic wet nighttime visual inspections of all markings to identify areas of markings that have inadequate wet nighttime retroreflectivity qualities. Replacement requirements are the same as those of markings found to have inadequate retroreflectivity during dry nighttime conditions.

Temporary pavement markers shall not be installed with Type D, Class III construction pavement markings.

IV. MEASUREMENT AND PAYMENT

Construction pavement markings, Type D, Class III will be measured in linear feet and will be paid for at the contract unit price per linear foot for the width specified. This price shall include furnishing and installing marking materials and adhesive, cleaning and preparing the surface, inspections, testing, and maintaining and removing markings and adhesive when no longer required.

Construction pavement message markings, Type D, Class III will be measured in units of each and will be paid for at the contract unit price per each for the message specified. This price shall include furnishing and installing message marking materials and adhesive, cleaning and preparing the surface, inspections, testing, and maintaining and removing message markings and adhesive when no longer required.

Payment will be made under:

Pay Item	Pay Unit
Construction Pavement Marking, Type D, Class III (Width)	Linear foot
Construction Pavement Message Marking, Type D Class III (Message)	Each